



UTAH GEOLOGICAL SURVEY
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UTAH DEPARTMENT OF NATURAL RESOURCES

Plate 1
Utah Geological Survey Miscellaneous Publication 97-1
Geologic Map of the Bear Lake South Quadrangle

GEOLOGIC MAP OF THE BEAR LAKE SOUTH QUADRANGLE, CACHE COUNTY, UTAH

by
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The Miscellaneous Publication Maps provide an outlet for authors who are not Utah Geological Survey staff. Not all aspects of this publication have been reviewed by the UGS.

DESCRIPTION OF MAP UNITS

Qa	Alluvium - Gravel, sand, silt, and clay located above major streams (probably older than Qal) and at isolated locations in other drainages (age uncertain).
Qal	Low-level alluvium - Gravel, sand, and mud in valley bottoms of major streams.
Qaf ₁	Younger alluvial-fan deposits - Poorly sorted, clay- to boulder-sized material in crudely stratified, fan-shaped deposits.
Qd ₁	Younger deltaic deposits - Gravel, sand, and silt capped by loess in delta-shaped exposures along Bear Lake; deposits are crudely stratified to stratified, and include two linear, beach ridges of sand and gravel.
Qd ₂	Older deltaic deposits - Crudely stratified gravel, sand, and silt apparently deposited in alluvial fans and at lower elevations in deltas in Bear Lake.
Qdma	Deltaic marsh deposits - Mud and sand in a marsh behind a beach ridge at the south end of North Eden delta.
Qlf	Fine-grained lacustrine sediments - Undifferentiated lacustrine sediments deposited behind beach ridges in the southwest corner of the Bear Lake South quadrangle.
Qls ₁	Younger lacustrine sand and gravel - Beach deposits near elevations of about 5,930 feet (1,807 m), including present shoreline.
Qls ₂	Older lacustrine sand and gravel - Beach deposits near and above 5,940 feet (1,810.5 m) elevation.
Qmc	Colluvium - Angular, silt- to boulder-sized material from nearby outcrops.
Qms	Landslides and slumps - Largely derived from the Wasatch Formation.
Qmt	Talus - Matrix-free, angular, pebble- to boulder-sized debris from the Nugget Formation along lakefront dip slopes.

Wasatch Formation	
Tw	Main body - Poorly exposed, red mudstone, and lesser sandstone and conglomerate.
Twl	Limestone member - Oncolitic and algal limestone, limestone flat-pebble conglomerate, and light-gray siltstone; interfingers with the main body such that this limestone map unit contains significant main-body lithologies in easternmost exposures.
Twin Creek Limestone	
Jtr	Rich Member - Massive, micritic limestone with pervasive pencil cleavage; has undergone extensive structural thickening and thinning.
Jts	Sliderock Member - Upper half - limestone packstone, wackestone, and micrite, grading up into the Rich Member; lower half - gray, resistant, sandy, lime packstone and grainstone with fossil fragments.
Jtg	Gypsum Spring Member - Red shale, siltstone, and sandstone; yellow sandstone; gray dolomite and brecciated dolomite; anhydrite in subsurface.
Jn	Nugget Sandstone - Red-orange, friable, medium- to fine-grained, quartz sandstone; capping by white, well-indurated sandstone is common.
Ankareh Formation	
Raw	Wood Shale Tongue - Not completely exposed; exposures are bright-red siltstone and shale.
Rh	Higham Grit - White to light purple, cross-bedded sandstone and pebble conglomerate.

Thaynes Formation	
Rti	Timothy Sandstone Member - Upper half - gray-green, glauconitic, medium-grained, calcareous sandstone and white, fine-grained, quartzose sandstone; lower half - red sandstone, siltstone, and shale.
Rtp	Portneuf Limestone Member - Gray to pink, mottled, massive, cherty limestone that is poorly exposed.
Ankareh Formation	
Ral	Lanes Tongue - Dull dark-red to purple-red shale, siltstone, and fine-grained sandstone.
Cgc	Geerts Canyon Quartzite - White to pink quartzite and pebble to granule conglomerate.

CROSS SECTIONS ONLY

Q	Quaternary undivided
Tsl	Salt Lake Formation
Twu	Wasatch Formation undivided

Outer Shelf Sequence - rocks of the Paris, Willard, and Meade-Laketown thrust sheets.

Ogc	Garden City Formation - Laminated to thin-bedded limestone, locally argillaceous.
Osc	St. Charles Formation - Thick-bedded limestone and dolomite.
Cn	Nounan Formation - Massive to medium-bedded limestone and dolomite.
Cbo	Bloomington Formation - Shale and nodular limestone.
Cbl	Blacksmith Dolomite - Thick-bedded dolomite.
Cu	Ute Formation - Thick-bedded limestone and dolomite above and below interbedded, thin limestone and shale.
Cl	Langston Dolomite - Thin- to thick-bedded limestone and dolomite.
Cgc	Geerts Canyon Quartzite - Mostly quartzite, but some argillite locally.

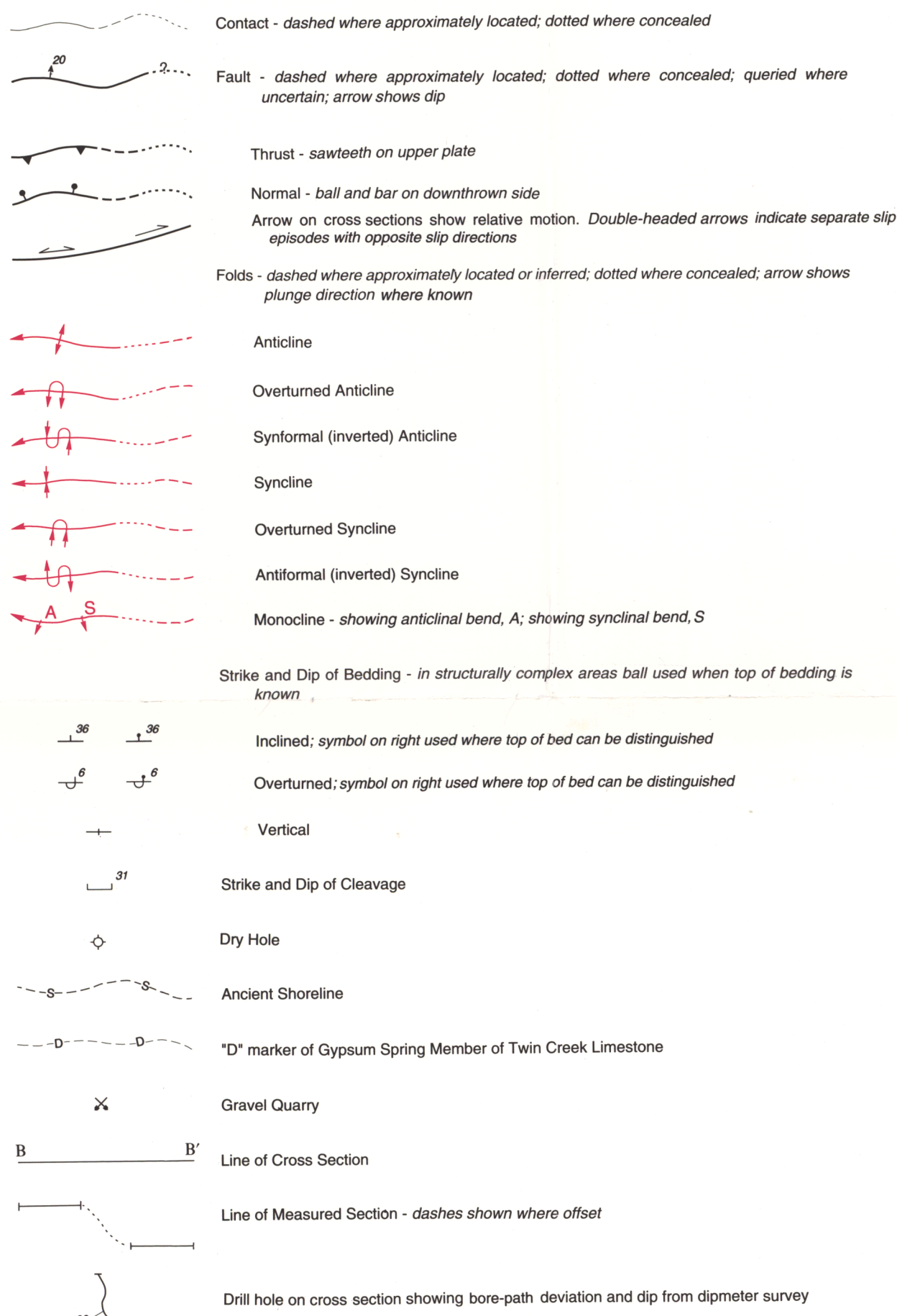
Transitional Shelf Sequence - rocks of the Home Canyon thrust sheet; same as Inner Shelf Sequence for Jurassic through Mississippian rocks.

D	Devonian undivided - Probably includes Leatham Formation (where present), Beirdneau Formation, Hyrum Dolomite, and Water Canyon Formation, or Three Forks and Jefferson Formations.
Sl	Laketown Dolomite - Thick-bedded dolomite.
O	Ordovician undivided - Probably includes Fish Haven Dolomite, Swan Peak Formation (where present), and Garden City Limestone.
C	Cambrian undivided - As depicted probably includes upper Cambrian rocks. St. Charles and Nounan Formations.

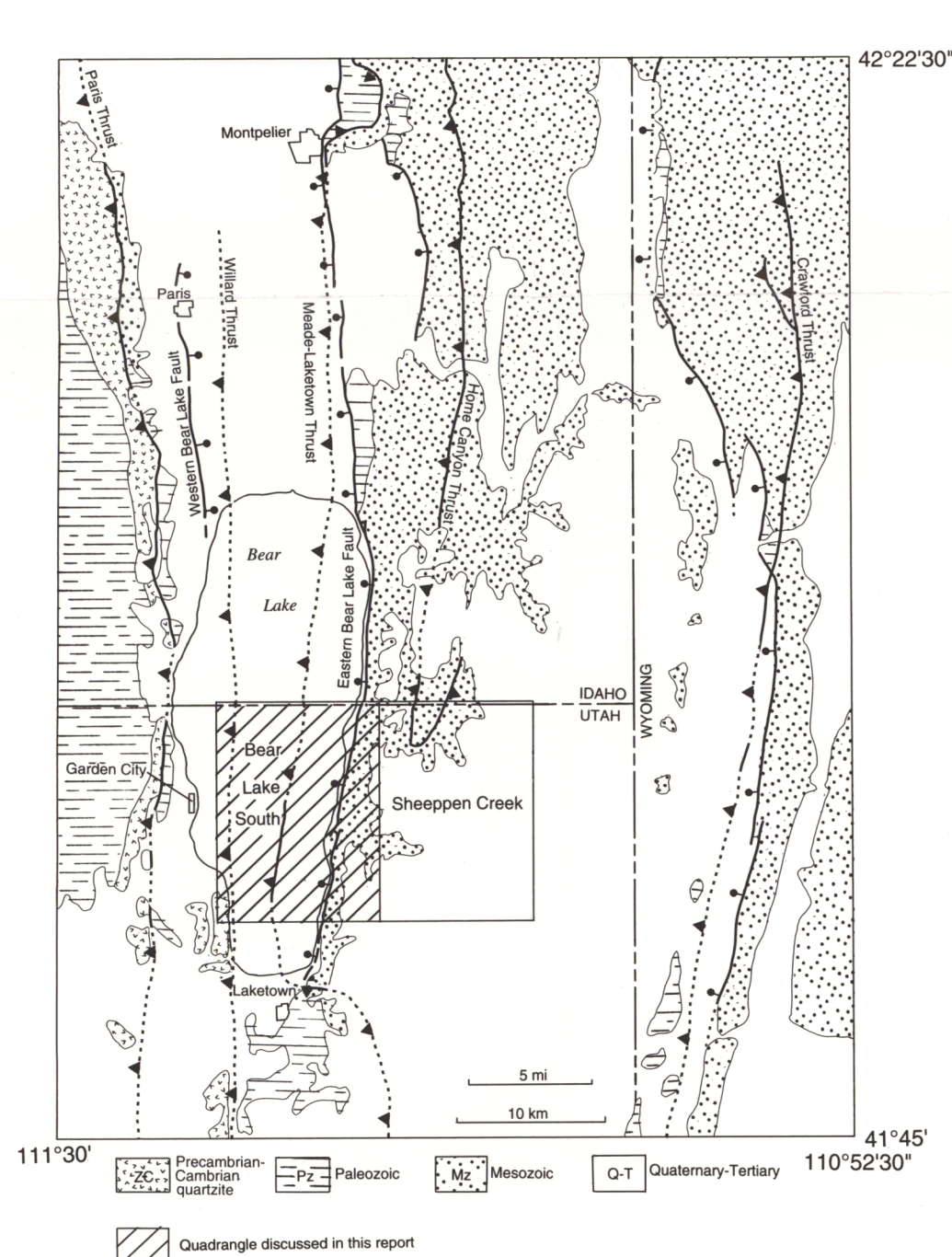
Inner Shelf Sequence - rocks of the Sheep Creek, Crawford, Absaroka, and other thrust sheets exposed east of the Bear Lake Plateau.

Jp	Preuss Redbeds - Sandstone and shale, with silt.
Twin Creek Limestone	
Jtgc	Giraffe Creek Member - Calcareous sandstone and limestone.
Jtl	Leeds Creek Member - Limestone.
Jtw	Watton Canyon Member - Limestone.
Jtb	Boundary Ridge Member - Shale and limestone.
Jtc	Twin Creek Limestone, undivided - Mostly limestone with some shale; siltstone, sandstone, dolomite, and anhydrite in basal member (Gypsum Springs).
Jn	Nugget Formation - Sandstone.
Raht	Wood Shale Tongue of the Ankareh Formation, Higham Grit, Timothy Sandstone and Portneuf Limestone Members of the Thaynes Formation, and Lanes Tongue of the Ankareh Formation - Mixture of shale, siltstone, sandstone, and limestone.
Rt	Thaynes Formation - Shale and limestone.
Rtw	Woodside and Dinwoody Formations - Shale and siltstone.
PPM	Phosphoria, Wells, and Amsden Formations - Limestone, chert, phosphatic shale, and sandstone.
Mm	Madison Group - Includes Mission Canyon Formation (=Brazos Dolomite) and Lodgepole Limestone - Thick-bedded dolomite and limestone.
Dd	Darby Formation - Shale, sandstone, and dolomite; sometimes called the Three Forks and Jefferson Formations in the Cordilleran fold and thrust belt.
Ob	Bighorn Dolomite - Thick-bedded dolomite.
Cg	Gallatin Limestone and Gros Ventre Formation - Thin-bedded, silty limestone, oolitic limestone, and shale.
Cf	Flathead Sandstone - Arkosic sandstone.
pCx	Crystalline basement rocks - Precambrian

MAP AND CROSS SECTION SYMBOLS

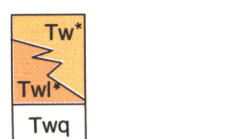
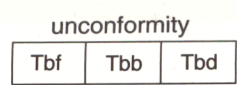
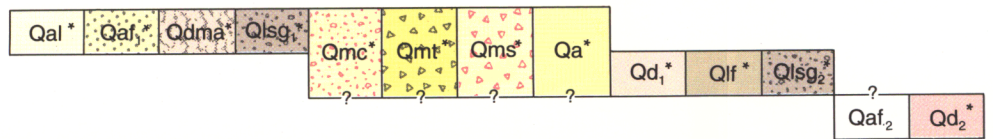


INDEX MAP

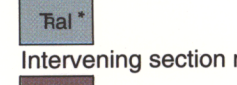
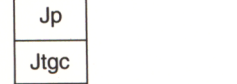


CORRELATION OF MAP UNITS

(*Indicates exposure in the Bear Lake South quadrangle)



regional angular unconformity



STRATIGRAPHIC COLUMN

(*Indicates exposure in the Bear Lake South quadrangle)

Time	Stratigraphic	Units	Formation and Members	Symbol	Thickness feet (meters)	Lithology
Quaternary			Surficial deposits	Q*	0-50 (0-15)	
Tertiary	Olig.	Basalt of Black Mountain		Tbf, Tbb, Tbd	0-40 (0-12)	unconformity
	Eocene	Wasatch Formation	Main body	Tw*	0-700 (0-210)	
			Limestone member	Twl*	0-400 (0-120)	oncolites in limestone
			Quartzite Conglomerate Member	Twq	0-100 (0-30)	
	Middle Jurassic	Preuss Redbeds		Jp	0-200 (0-60)	regional angular unconformity salt zone in wells
		Twin	Giraffe Creek Member	Jtgc	300 (100)	
			Leeds			
			Creek	Jtl	1550 (475)	
			Member			
		Creek	Watton Canyon Member	Jtw	800 (245)	
			Boundary Ridge Member	Jtb	265-300 (80-90)	oolitic
			Rich Member	Jtr*	550-730 (165-220)	
			Sliderock Member	Jts	250-500 (75-150)	
			Gypsum Spring Member	Jtg*	350 (105)	J2 unconformity "D" marker anhydrite zone in wells
	Lower Jurassic	Nugget Sandstone		Jn*	1300 (400)	J1 unconformity
						J0 unconformity?
Triassic	Upper	Ankareh Formation	Wood Shale Tongue	Raw*	400-570 (120-175)	
		Higham Grit		Rh*	135 (41)	unconformity
	Lower	Thaynes Formation	Timothy Sandstone	Rti*	125 (38)	
		Portneuf Limestone		Rtp*	65 (20)	chert
Cambrian	Middle	Ankareh Formation	Lanes Tongue	Ral*	508-580 (155-175)	Base not exposed
		Intervening Lower Triassic through Cambrian rocks not exposed in quadrangles. See cross sections.				Top not exposed
	Lower	Geerts Canyon		Cgc*	1200+ (365+)	
		Quartzite				Base not exposed